LETTER REPORT

NATIONAL STOCK NUMBER LEVEL
ISSUE AND STOCKAGE EFFECTIVENESS
DATA COLLECTION

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BACKGROUND: HQ AFMC uses issue and stockage effectiveness as a measure of their support to retail supply accounts. Currently, AFMC uses the Standard Base Supply System (SBSS) Management Effectiveness Report (M32) as the source for issue and stockage effectiveness. The M32 provides issue and stockage effectiveness at base level in several ways: by Expendability, Recoverability, Reparability, Cost Designator (ERRCD); by depot; and by weapon system. HQ AFMC believes issue and stockage effectiveness by stock number is a useful indicator of AFMC support to retail activities. However, since the SBSS does not currently provide issue and stockage effectiveness by stock number, AFMC does not have the data it needs to identify those stock numbers that contribute to the Air Force-wide decline in issue and stockage effectiveness. AFMC believes issue and stockage effectiveness by stock number would allow AFMC supply managers to focus attention on those assets that are not meeting established Air Force issue and stockage effectiveness goals.

In October 1998, AFMC sent out some "feelers" on if and how this metric could be obtained. In their search for someone to collect the data for and compute this new metric, AFMC inquired about the AFLMA's ability to perform this type of work. AFLMA/LGS responded that the Agency could provide this service as a "proof of concept" that the data for this metric could be economically collected and the metric could be computed.

PROBLEM STATEMENT: In November 1998, HQ AFMC/LG tasked the AFLMA to provide issue and stockage effectiveness by stock number. The AFLMA, therefore, needs a method to collect the data necessary to compute issue and stockage effectiveness by stock number.

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OBJECTIVES:
1) Develop a method (to include software) to collect the data needed to compute issue and stockage effectiveness by stock number.
2) Compute issue and stockage effectiveness by stock number for historical data first and then on a monthly basis thereafter.
3) Make issue and stockage effectiveness by stock number available on a monthly basis on a central site (e.g. Internet, file transfer, etc.) for Air Force-wide use.

METHODOLOGY: To meet the project objectives we developed a query program to collect the SBSS transaction history data needed to compute issue and stockage effectiveness. The query program was processed at every Air Force host supply account and selected the appropriate issue and due-out (backorder) transactions. Initially, for historical purposes, we collected data from Oct 97 through Feb '99. We "rolled up" our data by MAJCOM, by source of supply (ALC), and by ERRCD and compared it to M32 data to determine if our data collection and IE/SE computation matched the current M32 statistics.

To ensure we selected the appropriate transaction history records, we applied the M32 programming logic as documented in AFMAN 23-110 to our query program. Since the M32 excludes certain types of transaction history records we found it necessary to use the same logic in our program to ensure our data matched the M32 data. As a "sanity check", we also developed another query program that pulled **ALL** transaction history records. We then ran both of our query programs at several bases and compared the output from both programs to each other and to actual M32 data. We applied the M32 logic to the output from the ALL query program. Once we applied the M32 logic, it matched the output from the query program with the M32-like logic and came within one percent of matching actual M32 data.

We then ran the query program (with the M32-like logic) at seven bases and compared the output to M32 data. Note we obtained the M32 data from the Multi-Echelon Resource and Logistics Information Network/System Executive Management Report (MERLIN/SEMR). MERLIN is a logistics software analysis tool that provides access to a variety of logistics data (including SBSS IE and SE) to support performance reporting requirements and short-notice studies and analyses. We found that we could not get a perfect match of our data to SBSS M32 (via MERLIN) for the following reasons:

- MERLIN excludes M32 data if the source of supply is not one of the five major Air Force depots. For example, it excludes FPK (San Antonio ALC, Directorate of Special Weapons, Kelly AFB TX 78241) and FPD (USAF Cryptologic Depot, USAF Security Service, San Antonio TX 78243).
- MERLIN also excludes non-XD (consumables) M32 data.
- MERLIN is missing data. Some bases failed to provide M32 data for certain months.
- At some bases, transaction history data is only available for the previous 12-14 months-- the data is no longer kept on the system. So our data could not always be matched exactly to MERLIN data.

- Space Command M32 data has just recently been added to MERLIN
  - A few bases are missing in the AFLMA data (entire base is missing)

SA-ALC also compared our data to MERLIN data. SA-ALC provided Table 1 below, which shows (in terms of percentages) how much our data "differs" from the MERLIN IE/SE data. Note the numbers below do not take into consideration that the Sacramento ALC did not include Space Command M32 data. Once Space Command data is included the numbers are closer still.

Air Logistics Center	Issue Effectiveness (IE)	Stockage Effectiveness (SE)
Oklahoma City	1.17	0.64
Ogden	0.41	0.47
Kelly	0.40	0.16
Sacramento	8.37	5.83
Warner-Robins	2.17	1.43

Table 1 – Percent Difference Between MERLIN and NSN IE/SE Data

At this point there is not much we can do about the differences between our data and the MERLIN data other than document why the numbers are different. Note the discrepancies, mostly less than 2%, do not severely impact the IE/SE percentages. The discrepancies in the data can be traced to the reasons we just mentioned. We feel the data is about as close to M32 (MERLIN) data as we can get.

After we've collected and validated historical data, we continued to collect transaction data on a monthly basis using the same process. Our program will be processed monthly at every base and automatically sends output to the AFLMA via File Transfer Protocol (FTP). We then consolidated the data into one Air Force-wide file. The data is then used by another AFLMA-developed program to "count" issue and backorder transactions by stock number. Transactions are categorized as issues from stock, issues from WRM kits, backorders for stocked items, or backorders for non-stocked items. The program creates a single Air Force-wide file containing "transaction counts" by stock number.

The data is sent to the San Antonio Air Logistic Center where it is then imported into a database. SA-ALC, using this file, computes by stock number, issue and stockage effectiveness Air Force-wide. The IE/SE by stock number is made available on an FTP site. Any government or military agency can download a copy of the IE/SE database application (and the user-friendly screens developed by SA-ALC) to analyze or review at their leisure. It should be noted that providing the consolidated data to SA-ALC for the actual computation and posting of NSN IE/SE is different from our original intent. We originally planned to perform the computation and make the data available on our in-house web server, and actually developed the programs to do so. However, SA-ALC offered to take on this role, so under the guidance of the project POC we only collected and consolidated the data as explained above.

The intent of the SA-ALC database application is to:
- provide a user-friendly query capability to compute IE/SE by NSN
- provide a prototyping tool for collecting and displaying the data

The IE/SE data we collected is not Air Force-wide data; it excludes the depot (D035K) IE/SE data. The Air Force should collect this data as well and merge it with the SBSS data. AFMC should task D035K systems personnel (because the AFLMA does not have the expertise on the D035K system) to collect the data and forward it to the AFLMA. This data should be in the same format as the SBSS provides. Only then will the Air Force have Air Force-wide IE/SE statistics.

DISCUSSION: The project objective was to provide issue and stockage effectiveness by NSN. This entailed providing a proven data collection method and a standardized automated database capability. This method will help AF supply managers identify those stock numbers that are "underachieving" in the supply chain management process. The AFLMA developed a method to collect the data needed to compute IE by NSN. The San Antonio ALC developed an automated database capability to display retail IE by NSN that is now operational.

So, basically the Air Force currently is collecting IE/SE and has a database available on an FTP site (137.242.78.10) and is providing IE and SE data by NSN. The AFLMA initially indicated they would build a system to collect the data and continue to collect the data for some temporary period of time. The AFLMA is a studies and analyses organization and does not normally maintain software or manage production systems. AFMC is contemplating establishing a contract to build a database management system for collecting and maintaining the IE/SE data.

At issue is how elaborate the database management system needs to be. But first the Air Force should determine: *What is the need for and value of NSN level IE/SE data? Who needs it? What will they do with the data?* These questions need to be answered before the Air Force develops a system requiring a significant expenditure of resources. We have two concerns:

- First, there is no clear understanding of the relationship between issue and stockage effectiveness and other support metrics, for example, aircraft availability and mission capability. This is especially important considering the AFs reliability on the Readiness Based Levels (RBL) system to make stockage decisions. One clear weakness of stockage effectiveness as a metric is the fact that stockouts are treated as equally important, regardless of duration. For example, a backordered requisition that lasts one day counts the same as a backorder lasting one month. The Air Force uses the Aircraft Availability Model (AAM) to compute spares requirements and uses aircraft availability (measured as a time-weighted average) as a target for support. The Readiness Based Leveling (RBL) methodology allocates levels to individual users based on minimizing time-weighted backorders. Previous studies have also shown aircraft availability driven requirements generate significant variations in the "expected stockage effectiveness" (implied by either the AAM or RBL, for example) across individual items (AFLMA Final Report LS9500500). With the

AAM, expensive items tend to have lower expected effectiveness rates than less expensive items. With RBL, items with lower order and ship times (OSTs) will have smaller levels because of the reduced time lag until a requisition is filled. So, applying one goal to all items contradicts the model assumptions. Another concern is these indicators are influenced by the presence (or absence) of additive spares, i.e., an issue from an RSP is counted just like any other issue, meaning a base with an RSP may have multiple chances for an issue with no added weight to the multiple "levels" of stock. However, a backorder is a backorder, regardless. The mobility of RSPs is also not taken into account. These assets could be available at one point in time and then completely off limits at another. RSP authorizations are not considered when computing RBLs. Additionally, would a material manager change EXPRESS repair and distribution priorities because of low IE/SE statistics? Note EXPRESS also does not seek to achieve a given IE or SE goal. So we are cautious about the use of these statistics as individual item or weapon system performance indicators. Systems that measure and report issue effectiveness might be enhanced to include these "expected issue effectiveness" goals by NSN as a benchmark for performance.

- Secondly, the use and need for the data should drive the system design. We don't think the AF needs an elaborate database management system to maintain this data. At least, not until it decided exactly how the Air Force plans to use the data. The Air Force (or a contractor) can develop some standard reports and provide the capability to pull data to a PC spreadsheet or database for local use without developing a sophisticated (and relatively expensive) database management system.

If it is determined that NSN level IE/SE is a valid metric and should be collected on a long term basis, then the data collection process should be formally standardized and mandated. The data retrieval program that we developed is not as efficient as it would be if it was programmed by HQ SSG and the monthly process of contacting each base to make sure the program is processed is tedious and time consuming. The program should be institutionalized into the SBSS and ILS-S.

PROPOSALS: We have two proposals:

- The AFLMA will continue to maintain the data collection program, collect the raw data from the bases, and compile the data for export until the process is standardized and/or a contract is awarded. Once it is determined who will eventually manage the data (AFMC or a contractor), that activity will get the data sent straight to them. This will avoid duplication and multiple hand-offs, thereby reducing the chance for error.

- The AFLMA will assist with the transition to the new collector and maintainer of the data.

RECOMMENDATIONS:

1) Determine the value/use for retail-computed IE and SE by NSN.
   OPR: HQ AFMC/LG and HQ USAF/ILSP

2) Open a consulting project to continue the data collection process until an alternative is finalized.
OPR: AFLMA/LGS

3) Task HQ SSG/ILS to standardize the data collection process.
OPR: HQ USAF OCR: HQ SSG/ILS

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REPORT DOCUMENTATION PAGE

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13. ABSTRACT (Maximum 200 Words)

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